

MIGRATORY BUTTERFLIES.

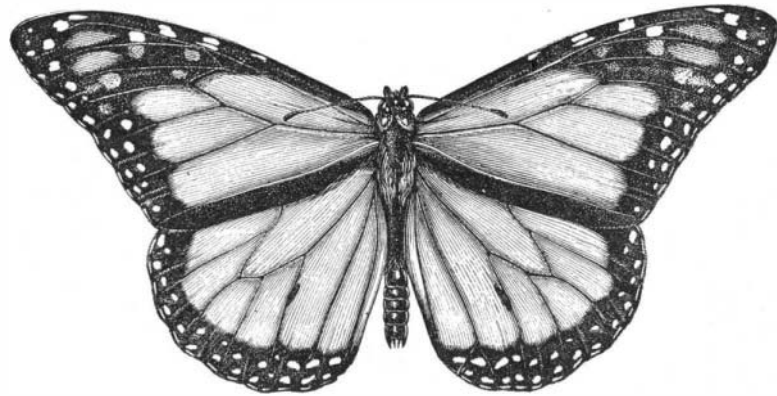
BY PROFESSOR C. V. RILEY.

Many quadrupeds that multiply rapidly acquire the migratory propensity. This is especially true of rats and lemmings, of the migrations of vast numbers of which numerous interesting accounts are recorded. Many insects normally non-migratory also exceptionally congregate and migrate in vast swarms, and this is especially the case with butterflies, flights of which, and particularly of the yellows (*Callidryas* and *colias*) and the whites (*Pieris*), have been reported from equatorial and South America, and from different parts of Europe. Vast flocks have also been observed at sea. The newspapers in the Southwest and the Signal officers were constantly reporting the passage over Iowa, Kansas, Missouri, and Texas of swarms of butterflies during the months of September and October last. These consisted, in every case where determinations were made, of the archippus butterfly (*Danaus archippus*), herewith illustrated. This is the principal species known to thus migrate in North America. In an account of the swarming of this butterfly, published in 1870 (3d Mo. Ent. Rep., p. 151), I wrote as follows:

"It would be difficult to give any satisfactory reason for this assembling together of such immense swarms of butterflies. . . . There are two significant facts connected with them, from which some corollary might be deduced, namely, that only those species which have a very extended range are known to form such flocks, and that they always travel, under these conditions, in a southerly or southwesterly direction. Mr. Bates ('Naturalists on the River Amazon,' vol. i., p. 249) gives an interesting account of the uninterrupted procession of butterflies belonging to the genus *Callidryas*, which passed from morning till night in a southerly direction across the Amazon, and as far as he could ascertain these migratory hordes were composed entirely of males. As I have abundantly proved, by examination of specimens since the above was written, the individuals composing the swarms of our archippus butterfly comprise both sexes; if anything, the females prevail. No satisfactory explanation of these swarms has been given, but I think they are for the most part due to an instinctive tendency to reach a warmer country in which to hibernate, and to a failure of food in the country where they developed. The flights almost always occur in autumn, when the milkweeds (*Asclepias*), upon which the larva of this butterfly feeds, have perished. The instinct to propagate is therefore at the time in abeyance. The butterflies, unable to supply themselves with sweets from flowers, are either attracted in quantities to trees that are covered with honey-secreting plant lice or bark lice, or else they must migrate southward, where flowers are yet blooming. All insects acquire the migrating instinct when crowded together through excessive multiplication. The archippus butterfly hibernates within hollow trees and in other sheltered situations. Southerly timber regions offer most favorable conditions for such hibernation. Under the most favorable conditions a large majority perish. A small portion of the females survive the winter. Such hibernated individuals, up-

on waking from their winter torpor, make at once for the prairies, where the milkweeds most abound. Faded, and often tattered, they may be seen flying swiftly over such prairies, for the wings of the species are strong and large. I have no doubt but that they travel thus for many hundreds of miles, keeping principally to the north, and, ere they perish, supplying the milkweeds here and there with

may be looked upon as continuations of the autumn flights. Hibernating in the temperate belt, they are awakened and aroused upon the advent of spring, to find the milkweeds not yet started, and they instinctively pass to more southern regions, where spring is more advanced. In short, these migrations find their readiest explanation in the instinct of the species to lengthen the breeding season and to extend its range; and the prevailing winds at particular seasons are of a character to assist it. There is a southward migration late in the growing season in congregated masses, and a northward dispersion early in the season through isolated individuals. It is a notable fact that the two butterflies which most display this instinct, namely, the species in question and the "painted lady" (*Cynthia cardui*), have the widest range of known species. The last is cosmopolitan, occurring in all four quarters of the globe; while our archippus, originally confined to America, though ranging from Canada to Bolivia, appears to be following the milkweeds wherever these are, through chance or purpose, introduced. It has lately spread over some of the islands of the Pacific, to Queensland and New Guinea, and over the Azores to Europe, such spread necessarily indicating great power of long-sustained flight, since the milkweeds are not plants of commercial value, and it is highly improbable that the species has been carried in any of the preparatory states on ships."



THE ARCHIPPUS BUTTERFLY.

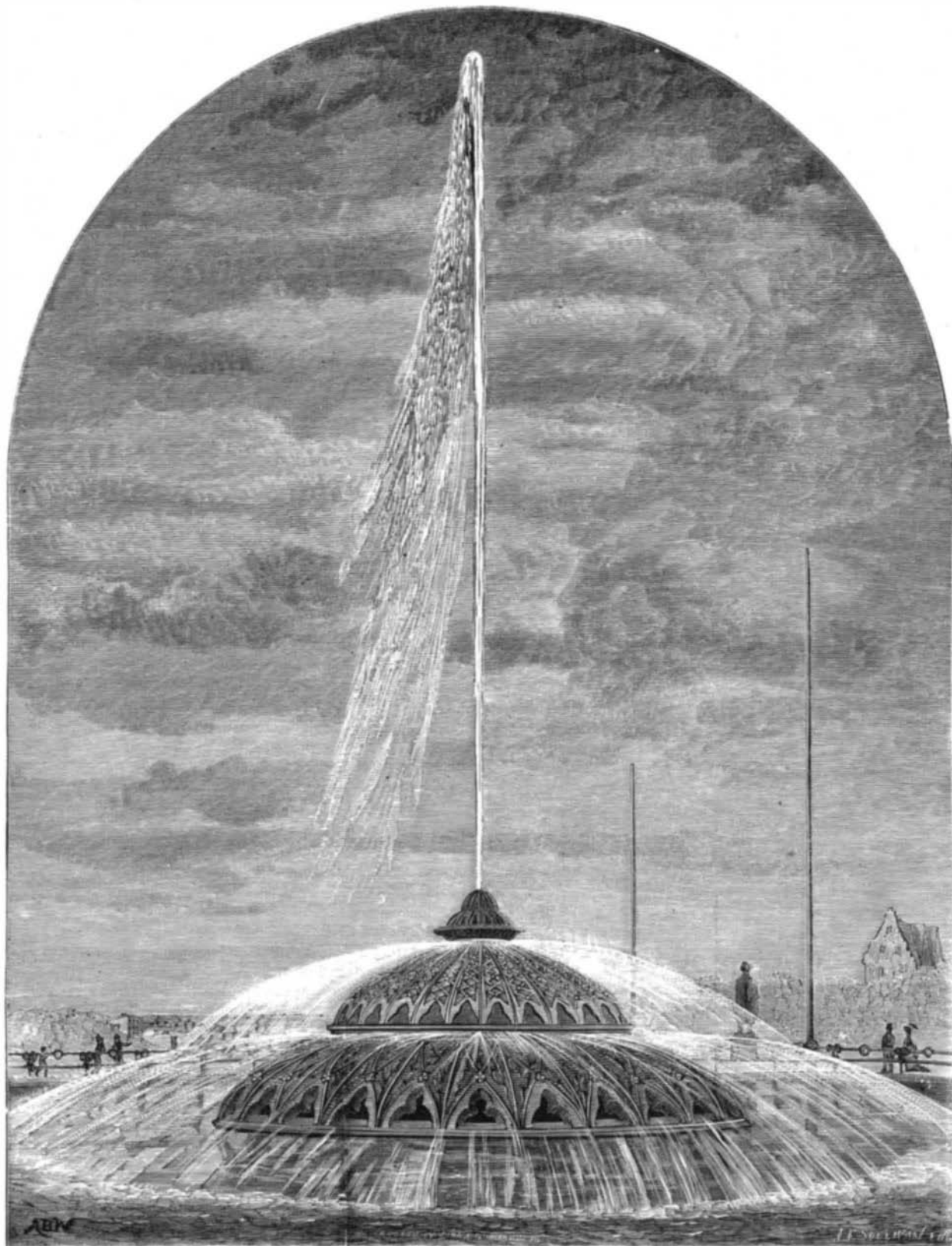
eggs. A fresh brood is produced in less than a month, and these extend still further north, until we find the species late in the growing season as far up as the Saskatchewan country, where it can scarcely successfully hibernate, and from whence the butterflies instinctively migrate southward.

"We can thus understand how there are two, three, or more broods in southerly regions, but only one toward British America. The exceptional flights noticed in the spring, and which, so far as recorded, take place quite early and in the same southerly direction, find a similar explanation. They

A BETON FOUNTAIN, PROSPECT PARK, BROOKLYN.

Our engraving represents the Plaza Fountain in Prospect Park, Brooklyn, one of the most tasteful and beautiful ornaments in that pleasure ground. It is fed with water from the city water works, which are supplied from a chain of ponds some nineteen miles from the city, and extending from Jamaica east to Hempstead Plains. From these sources the water is brought in a brick-covered conduit to Ridgewood reservoir, into which it is forced by three powerful engines. This reservoir has a capacity for about 160,000,000 gallons, and is located at an elevation of 170 feet above the East River. Besides this, Mount Prospect Reservoir has a capacity for 20,000,000 gallons, with an elevation of 28 feet above that of Ridgewood. From these two reservoirs the water is distributed throughout the city through about 277 miles of pipe. To secure a supply in case of drought, a storage reservoir, having a capacity for 1,055,000,000 gallons, is in process of construction. The daily consumption of water in the city is about 30,000,000 gallons.

The fountain we illustrate is especially remarkable both for its design and for the material in which the same is carried out. In the center of the basin is a grand dome 113 feet in circumference. The base is a series of Gothic arches, up the sides of which are defined beautifully trailing vine leaves. From a ring of smaller circumference issue innumerable jets, so as to form one sheet of water, which falls into the basin, leaping over the arches. The space beneath the dome is illuminated at night, producing an exceedingly beautiful effect, as the light is reflected on the water. From the summit of the structure a single strong jet rises perpendicularly in the



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